<u>Amendment to the Claims</u>

<u>In the Claims</u>:

Please cancel Claim 28.

Please amend Claims 1, 12, 27, 29-31, 32, and 43 as follows:

1. (Currently Amended) A scanner, comprising:

(a) a waveguide having a distal end and a proximal end, said distal end being formed to have a nonlinear taper that decreases in size along a longitudinal axis of the waveguide, toward a distal tip of the waveguide;

(b) a scanning actuator disposed adjacent to the waveguide, said scanning actuator driving the waveguide to ~~move~~ <u>vibrate</u> the distal tip in a desired scanning motion; and

(c) a control circuit that is coupled to the scanning actuator, said control circuit being adapted to selectively energize the scanning actuator to move the distal tip of the waveguide so as to scan a field of view.

2. (Original) The scanner of Claim 1, wherein the distal portion of the waveguide comprises at least two distinct sections of differing radii around the longitudinal axis of the waveguide, each section having a different resonance when driven by the scanning actuator, so that the two distinct sections are able to move as decoupled bodies when driven by the scanning actuator.

3. (Original) The scanner of Claim 2, wherein one of the two sections is driven to resonate about a first axis that is orthogonal to the longitudinal axis, and the other section is driven to resonate about a second axis that is substantially orthogonal to the longitudinal axis and to the first axis so that a scan rate of the waveguide about the first axis is different than about the second axis.

4. (Original) The scanner of Claim 1, wherein a hinge portion adjacent to the distal tip of the waveguide is reduced in cross-sectional size relative to proximal and distal portions of the waveguide that are immediately adjacent to the hinge portion.

5. (Original) The scanner of Claim 4, wherein the hinge portion is disposed along the longitudinal axis of the waveguide where a node is formed when the waveguide is driven into resonance by the scanning actuator, and wherein the waveguide is driven at least at a resonance of mode two.

6. (Original) The scanner of Claim 5, wherein the distal tip disposed beyond the hinge portion is substantially more rigid than the hinge portion.

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7. (Original) The scanner of Claim 1, further comprising a mass element that is disposed proximate the distal tip of the waveguide to reduce a positional displacement of the distal tip without substantially reducing an angular displacement of the distal tip when the distal end of the optical is driven by the scanning actuator.

8. (Original) The scanner of Claim 7, wherein the mass element comprises a lens that is coupled to the distal tip of the waveguide.

9. (Original) The scanner of Claim 8, wherein the lens is integrally formed from the waveguide.

10. (Original) The scanner of Claim 1, wherein the scanning actuator causes the distal end of the waveguide to scan in a near resonant motion in at least a second order mode.

11. (Original) The scanner of Claim 1, wherein the scanning actuator applies force to the distal end of the waveguide, causing the distal tip of the waveguide to describe one of:

(a) a circular motion;

(b) a helical motion;

(c) a Lissajous pattern;

(d) an arc;

(e) a whirl pattern;

(f) a rotating elongated propeller pattern; and

(g) a raster scanning pattern.

12. (Currently Amended) The scanner of Claim 1, wherein the scanning actuator applies a force that is substantially orthogonal to the direction of actuator displacement, said force causing ~~motion~~ vibration of the distal tip of the waveguide.

13. (Original) The scanner of Claim 1, further comprising a linear actuator that is coupled to the control circuit, said linear actuator periodically varying a force applied to the waveguide and directed generally along the longitudinal axis of the waveguide, said scanning actuator causing the distal end of the waveguide to describe an arc, said controller controlling the forces applied by the linear actuator and the scanning actuator so as to substantially flatten the arc.

14. (Original) The scanner of Claim 1, further comprising a micro-lens formed on the distal tip of the waveguide.

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15. (Original) The scanner of Claim 1, wherein the distal tip of the waveguide is caused to move in a pattern that scans a region disposed adjacent to the distal tip of the waveguide.

16. (Original) The scanner of Claim 1, wherein the distal tip of the waveguide is driven in a pattern desired for one of:

(a) an image acquisition of a region disposed adjacent to the distal tip of the waveguide; and

(b) an image display on a region illuminated with light emitted from the distal tip of the waveguide.

17. (Original) The scanner of Claim 1, wherein the scanning actuator comprises one of a bimorph piezoelectric actuator, a tube actuator, an electro-thermal actuator, an opto-thermal actuator, an electromagnetic actuator, a galvanometric actuator, a magnetostriction actuator, an ultrasonic actuator, an electrostriction actuator, and an electrostatic actuator.

18. (Original) The scanner of Claim 1, wherein the scanning actuator is configured to have a resonant frequency that is selected to be substantially equal to a mechanical resonant frequency of the waveguide about at least one axis of movement.

19. (Original) A method for creating a hinge in a light guide, comprising the steps of:

(a) providing a waveguide with a tapered portion having a cross-sectional size that decreases toward an end of the waveguide, along a longitudinal axis of the waveguide;

(b) heating a material comprising the waveguide at a point along the tapered portion where it is desired to produce the hinge sufficiently so that the material flows and is capable of being deformed, but remains viscous;

(c) substantially reducing the cross-sectional size of the tapered portion at the point where the hinge is desired after the material has been heated in step (b), to produce a necked-down section comprising the hinge; and

(d) enabling the taper portion of the waveguide to cool to an ambient temperature, said waveguide more readily bending at the hinge than at other portions of the tapered section when driven by an applied force.

20. (Original) The method of Claim 19, wherein the step of heating is carried out using a coherent light source to heat the material.

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21. (Original) A method for creating a hinge in a light guide, comprising the steps of:

(a) providing a waveguide with a tapered portion having a cross-sectional size that decreases toward an end of the waveguide, along a longitudinal axis of the waveguide; and

(b) immersing the tapered portion of the waveguide into fluid having a plurality of layers, including an acid layer disposed between inert liquid layers, so that a point along the tapered portion where it is desired to produce the hinge is immersed in the acid layer, said acid layer etching the tapered portion of the waveguide, to produce a reduced diameter section comprising the hinge, said waveguide more readily bending at the hinge than at other portions of the tapered section when driven by an applied force.

22. (Original) A method for forming a micro-lens on a waveguide, comprising the steps of:

(a) providing a waveguide having a tapered cross-sectional size toward a distal end along a longitudinal axis of the waveguide;

(b) applying a drop of an optical adhesive material adjacent to the distal end of the waveguide;

(c) rotating the waveguide while the waveguide is directed radially relative to a center of rotation, causing the optical adhesive material to form a micro-lens having a desired shape at the distal end of the waveguide; and

(d) causing the optical adhesive material to become set in the desired shape of the micro-lens.

23. (Original) The method of Claim 22, wherein the step of causing the optical adhesive material to become set comprises the step of curing said material with light of a predefined range of wavelengths.

24. (Original) The method of Claim 22, wherein the step of causing the optical adhesive material to become set comprises the step of curing said material with heat applied thereto.

25. (Original) The method of Claim 22, wherein the step of causing the optical adhesive material to become set is carried out while the waveguide is being rotated.

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26. (Original) The method of Claim 22, further comprising the steps of:

(a) directing light through the waveguide while it is rotating;

(b) monitoring characteristics of the light emanating from the micro-lens; and

(c) determining whether the micro-lens has achieved a desired form, based upon the characteristics of the light emanating from the micro-lens, to determine when to carry out the step of causing the optical adhesive material to become set.

27. (Currently Amended) A method for forming a micro-lens on a waveguide, comprising the steps of:

(a) directing a beam of energy at a distal tip of the waveguide to heat a material comprising the distal tip;

(b) heating the distal tip of the waveguide with the beam of energy to melt the material;

(c) forming the micro-lens from a droplet of the material that has been melted; ~~and~~

(d) <u>applying a force to shape the micro-lens so as to achieve desired optical properties for the micro-lens; and</u>

<u>(e)</u> allowing the droplet to cool.

28. (Cancelled)

29. (Currently Amended) The method of Claim ~~28~~ <u>27</u>, wherein the force is a centrifugal force applied by rotating the waveguide while a longitudinal axis of the waveguide is generally radially aligned relative to a center of rotation.

30. (Currently Amended) The method of Claim ~~28~~ <u>27</u>, wherein the force is applied along an axis of the waveguide using a driver that moves the waveguide along its longitudinal axis.

31. (Currently Amended) The method of Claim ~~28~~ <u>27</u>, further comprising the step of monitoring light that has passed through the droplet to determine the optical properties of the micro-lens and to control the step of forming the droplet to achieve <u>the</u> desired optical properties for the micro-lens.

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32. (Currently Amended) A scanner, comprising:

(a) a waveguide having a distal end and a proximal end, said distal end being formed to have a taper that decreases in size along a longitudinal axis of the waveguide, toward a distal tip of the waveguide;

(b) a micro-lens formed on the distal tip of the waveguide;

(c) a scanning actuator disposed adjacent to the distal end of the waveguide, said scanning actuator causing the distal tip of the waveguide to ~~move~~ vibrate in a desired scanning motion; and

(d) a control circuit that is coupled to the scanning actuator, said control circuit being adapted to selectively energize the scanning actuator to move the distal tip of the waveguide so as to scan a field of view.

33. (Original) The scanner of Claim 32, wherein the distal portion of the waveguide comprises at least two distinct sections of differing radii around the longitudinal axis of the waveguide, each section having a different resonance when driven by the scanning actuator, so that the two distinct sections are able to move as decoupled bodies when driven by the scanning actuator.

34. (Original) The scanner of Claim 33, wherein one of the two sections is driven to resonate about a first axis that is orthogonal to the longitudinal axis, and the other section is driven to resonate about a second axis that is substantially orthogonal to the longitudinal axis and to the first axis so that a scan rate of the waveguide about the first axis is different than about the second axis.

35. (Original) The scanner of Claim 32, wherein a hinge portion adjacent to the distal tip of the waveguide is reduced in cross-sectional size relative to portions of the waveguide that are immediately adjacent to opposite ends of the hinge portion.

36. (Original) The scanner of Claim 35, wherein the hinge portion is disposed along the longitudinal axis of the waveguide where a node is formed when the waveguide is driven into resonance by the scanning actuator, so that the distal tip disposed beyond the hinge portion is driven at least at a resonance of mode two.

37. (Original) The scanner of Claim 32, wherein the scanning actuator causes the distal end of the waveguide to move in a near resonant motion in at least a second order mode.

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38. (Original) The scanner of Claim 32, wherein the scanning actuator applies a force to the waveguide, causing the distal tip of the waveguide to describe one of:

(a) a circular motion;

(b) a helical motion;

(c) a Lissajous pattern;

(d) an arc;

(e) a whirl pattern;

(f) a rotating elongated propeller pattern; and

(g) a raster scanning pattern.

39. (Original) The scanner of Claim 32, further comprising a linear actuator that is coupled to the control circuit, said linear actuator periodically varying a force applied to the waveguide and directed generally along the longitudinal axis of the waveguide, said scanning actuator causing the distal end of the waveguide to describe an arc, said controller controlling the forces applied by the linear actuator and the scanning actuator so as to substantially flatten the arc.

40. (Original) The scanner of Claim 32, wherein the distal tip of the waveguide is driven in a pattern that scans a region disposed adjacent to the distal tip of the waveguide.

41. (Original) The scanner of Claim 32, wherein the distal tip of the waveguide is driven in a pattern desired for one of:

(a) an image acquisition of a region disposed adjacent to the distal tip of the waveguide; and

(b) an image displayed on a region with light emitted from the distal tip of the waveguide.

42. (Original) The scanner of Claim 32, wherein the scanning actuator comprises one of a bimorph piezoelectric actuator, a tube actuator, an electro-thermal actuator, an opto-thermal actuator, an electromagnetic actuator, a galvanometric actuator, a magnetostriction actuator, an ultrasonic actuator, an electrostriction actuator, and an electrostatic actuator.

43. (Currently Amended) A scanner, comprising:

(a) an elongate structure having a distal end and a proximal end, said distal end being formed to have a nonlinear taper that decreases in size along a longitudinal axis of the structure, toward a distal tip of the structure;

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(b) a scanning actuator disposed adjacent to the structure, said scanning actuator driving the structure to ~~move~~ vibrate the distal tip in a desired scanning motion; and

(c) a controller that is coupled to the scanning actuator, said controller being adapted to selectively energize the scanning actuator to move the distal tip of the waveguide so as to scan the structure in the desired scanning motion.

44. (Original) The scanner of Claim 43, further comprising an active device disposed proximate the distal tip of the structure, said active device being caused to move with the distal tip of the structure in the desired scanning motion.

45. (Original) The scanner of Claim 44, wherein the active device comprises a light source.

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